DOCUMENT RESUME

ED 035 174 EF 001 076

TITLE Supplementary Classroom.
NOTE 23p.

EDRS PRICE EDRS Price MF-$0.25 HC-$1.25
DESCRIPTORS *Classroom Design, *Component Building Systems, *Mobile Classrooms, *Self Contained Classrooms

ABSTRACT

Three prototype portable classrooms were developed for both conventional and component construction. One of these economical units was built for $7.50 per square foot. Construction of each type is explained through use of photographs and text. Included in the presentation are--(1) cluster grouping suggestions, (2) interior and exterior photographs, and (3) elevations, sections, and a floor plan. (MH)

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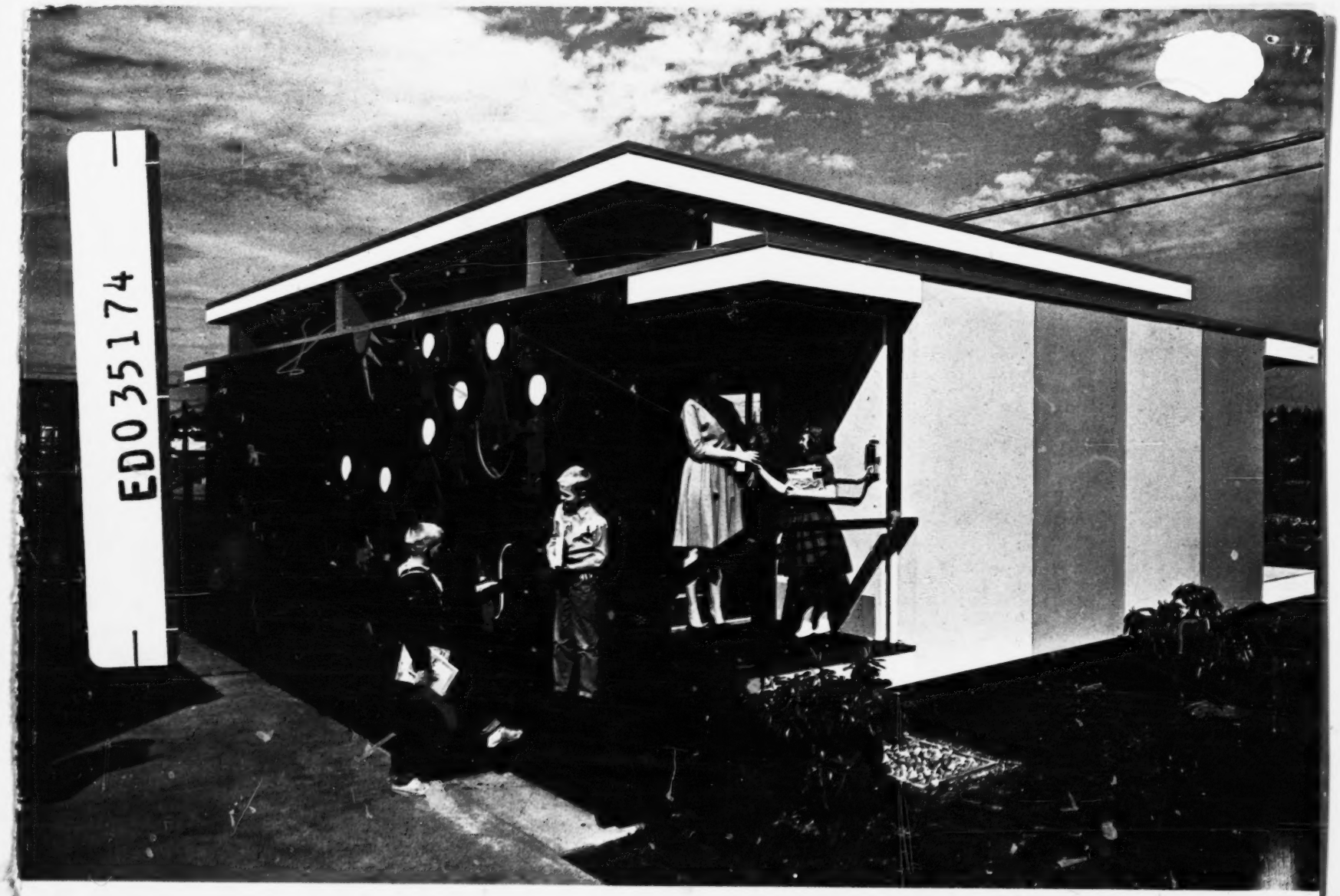

PRESENTING A REALISTIC APPROACH

TO HOUSING AMERICA'S GROWING, SHIFTING

SCHOOL POPULATIONS.

EF 001 076

THE DOUGLAS FIR PLYWOOD ASSOCIATION

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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Supplementary Classroom

THIS BOOKLET IS DEDICATED TO

THE NATION'S HARD-WORKING

SCHOOL BOARD MEMBERS WHO ARE

FACED WITH THE PROBLEM OF

RAISING FUNDS TO MEET

GROWING SCHOOL NEEDS. IT OFFERS

ONE PRACTICAL MEANS OF

FINANCING SCHOOLS THROUGH THE

USE OF OPERATING FUNDS RATHER

THAN AWAITING BOND ISSUES.

ED035174

Supplementary Classroom

One of the most difficult problems facing school boards today is that of student populations that not only continue to grow—but shift restlessly from area to area within districts. To help solve this problem, the Douglas Fir Plywood Association developed the DFPA Supplemental Classroom. It not only incorporates desirable features of modern permanent classrooms, but includes these important advantages as well:

LOW COST CONSTRUCTION

By fully utilizing plywood's inherent structural advantages, a prototype classroom was built in Tacoma, Washington, for *$7.50 per square foot*, including all but cabinet work, furniture and miscellaneous interior fittings. Because of its low cost, the district was able to proceed with construction immediately, utilizing normal operating funds without waiting for a special bond issue. The building would also be ideal for private investors to provide to school districts on a lease-purchase basis.

SIMPLE CONSTRUCTION

The DFPA Supplemental school was designed for two types of construction—conventional and component. With the use of readily available lumber and plywood, the conventional supplemental school can be built by school district's maintenance crews or building contractors. The component school utilizes components manufactured by plywood fabricators off-site and erected by contractors on-site resulting in a substantial reduction in on-site labor time.

PORTABILITY

The plywood supplemental school was designed as a true portable. It can be lifted—intact—onto standard moving equipment and its dimensions are under the maximums prescribed by most state laws for movement on the highways.

Three of these show-case classrooms were built by the Douglas Fir Plywood Association in a school district near DFPA's Laboratories in Tacoma, Washington.*

Unit No. 1 was an addition to the Brookdale Elementary School for the Franklin Pierce School District using conventional on-site construction

*Complete detailed time and cost figures were kept during the construction of units one and two. These are available upon request from the Douglas Fir Plywood Association, Tacoma 2, Washington. Due to the experimental nature of unit no. three, no detailed time or cost figures were kept.

techniques with standard lumber framing, stock plywood panels and nailed-only plywood box beams. Square foot cost for this unit was $7.50 including all but cabinets, furniture and minor interior finish details.

Unit No. 2 was built at the James Sales Elementary School, also in the Franklin Pierce district. This classroom was completely componentized using plywood stressed skin floor and roof panels with Lu-Re-Co type wall panels and glued plywood box beams. Virtually the entire building, not including footings, posts or floor beams was delivered to the site by truck from a fabricator's plant in just 72 separate pieces. The use of new long-lasting factory applied roof and wall finishes was another feature of this unit. This unit, with ordinary finishes, could be duplicated for about $7.70 per square foot.*

Unit No. 3 is a student financed lounge and bookstore for Franklin Pierce High School. Of the same basic design as units 2 and 3, it differs from the others in its use of experimental sidings.

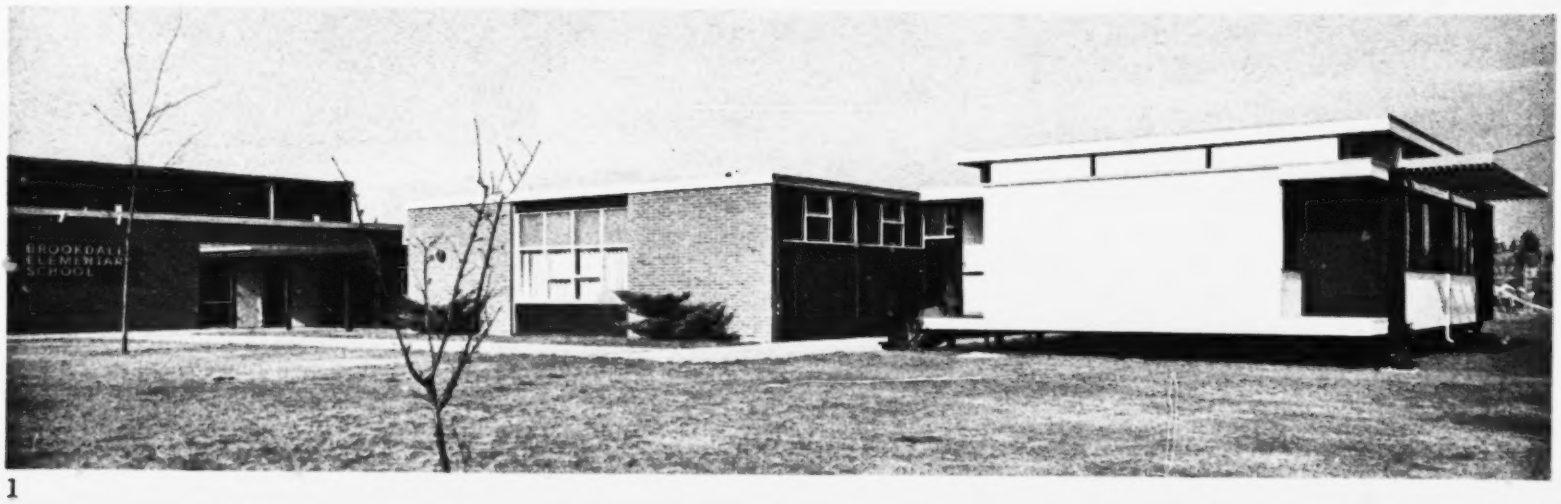
Construction of these prototype classrooms is covered through step-by-step photos on the following pages. Study plans and suggested classroom cluster arrangements have also been included.

1
Much thought was given to appearance of buildings. Simple, contemporary lines help this supplementary classroom blend well with most types of existing architecture. Low maintenance finishes were also important considerations.

2
Plywood cutouts add playful touches that do much toward creating an exciting atmosphere for learning . . . a factor often overlooked in much portable classroom planning.

3
Abundant, controlled natural lighting is achieved by window wall and sun screen. Plastic panels between upper and lower roof lines provide subdued clearstory lighting.

*Because of the use of factory applied finishes on unit two, square foot costs here are given for components without these exotic finishes.



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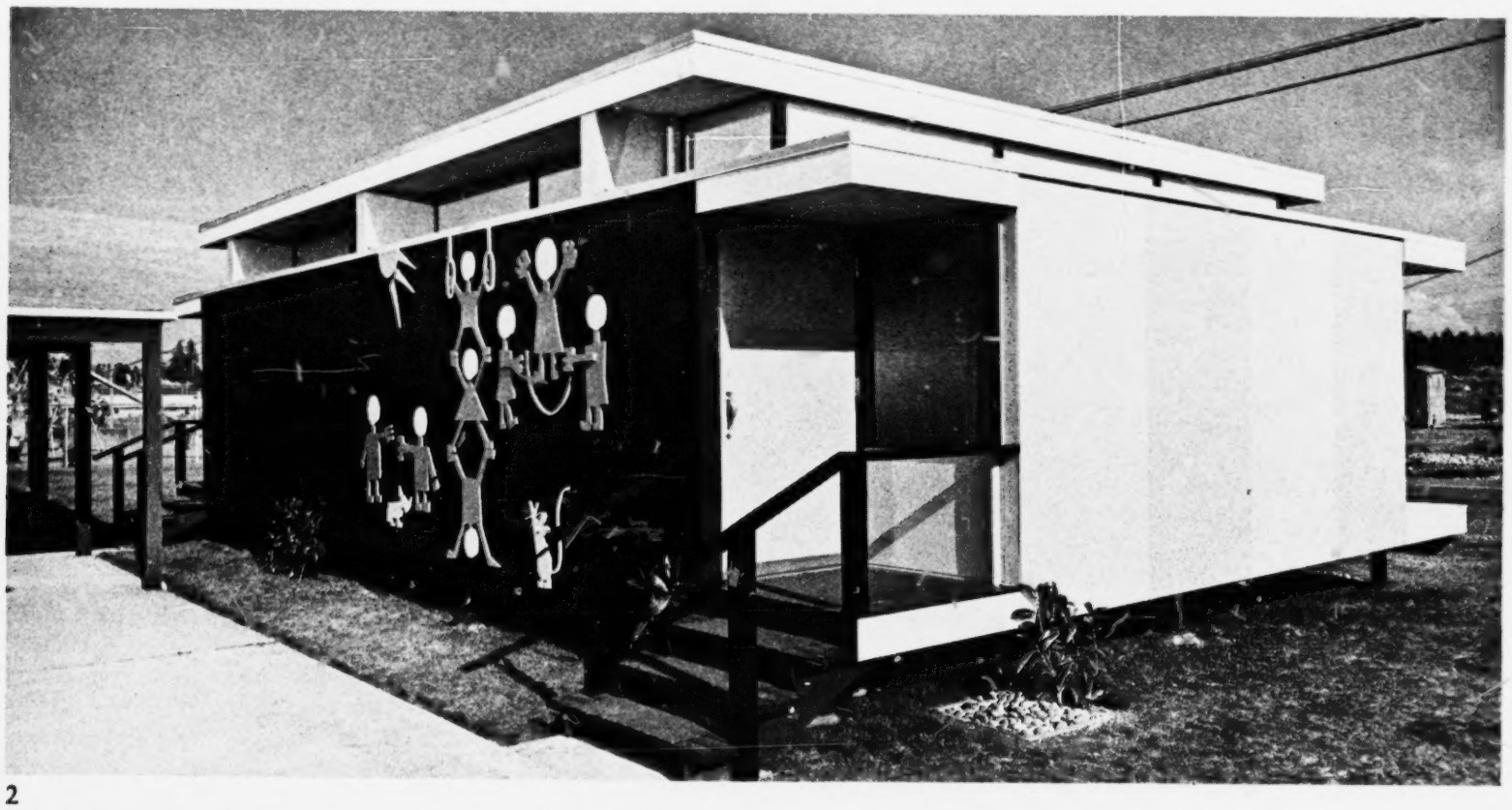

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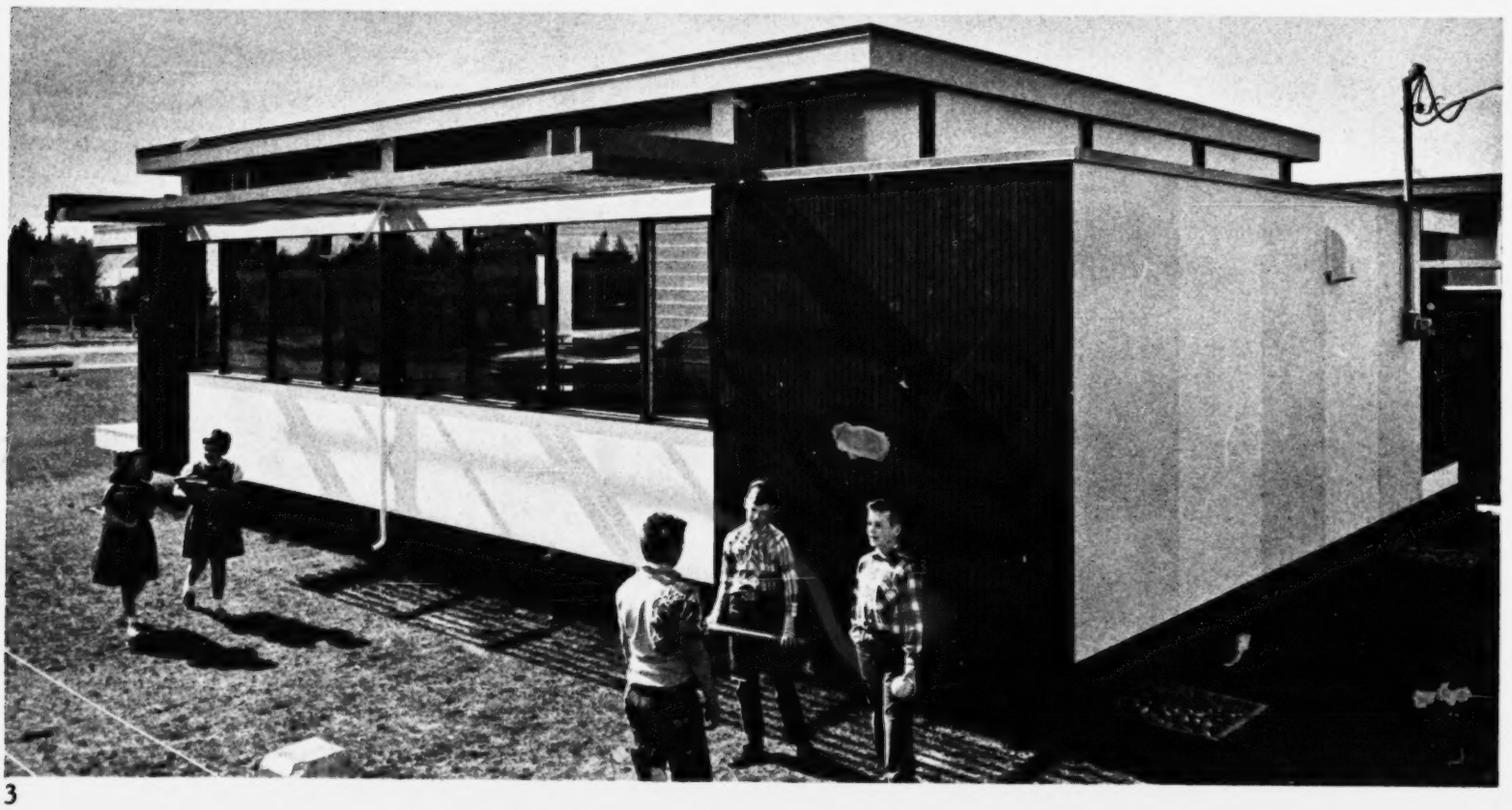

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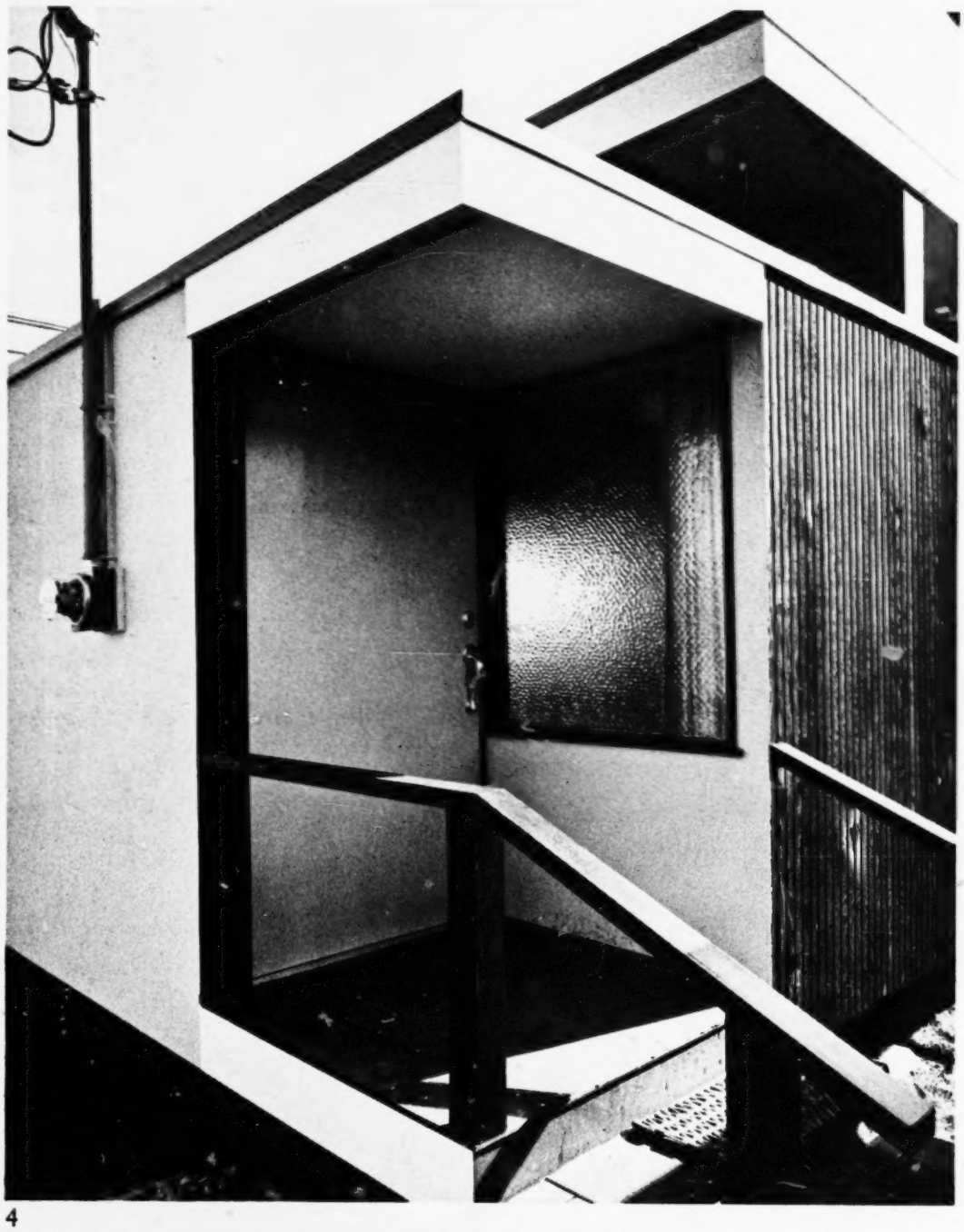


4

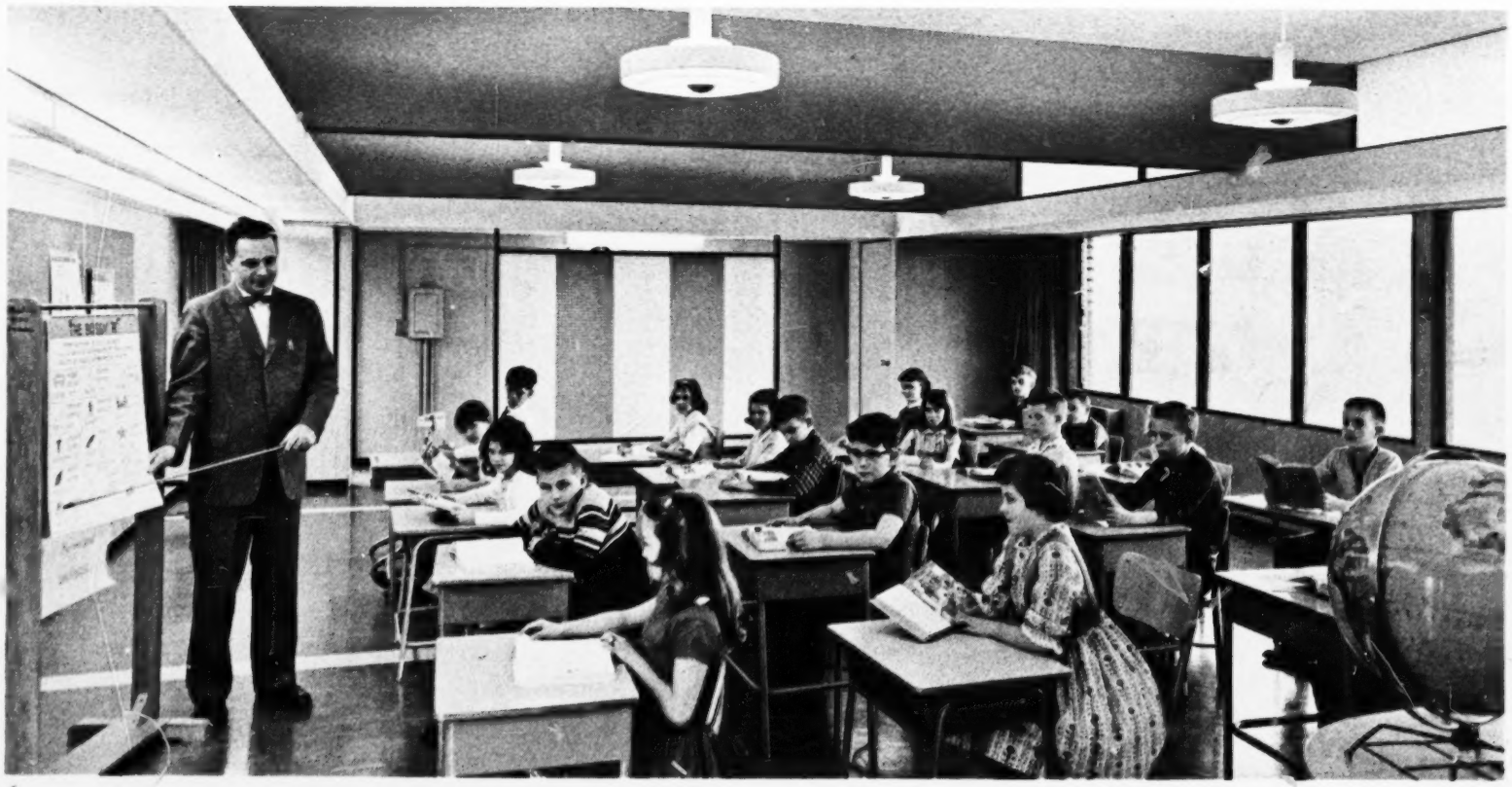
5

4
Student safety is considered throughout these buildings. Two such exits are provided in each unit, providing virtually ground level egress from classes.

5
Recessed planter areas help to break up severe modern lines of the units. Note clean, contemporary appearance achieved with Texture One-Eleven and Overlaid plywood sidings.

6
Each unit contains 912 square feet of fully usable space. Each unit is divided functionally, but not by physical partitions. Wide open floor plan also can be adapted for other uses after class room needs have passed.

Fully adjustable (height and width) chalkboards are well lighted, too. Exposed wiring conduit was important in keeping wiring costs down without detracting from appearance or safety of building.



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6

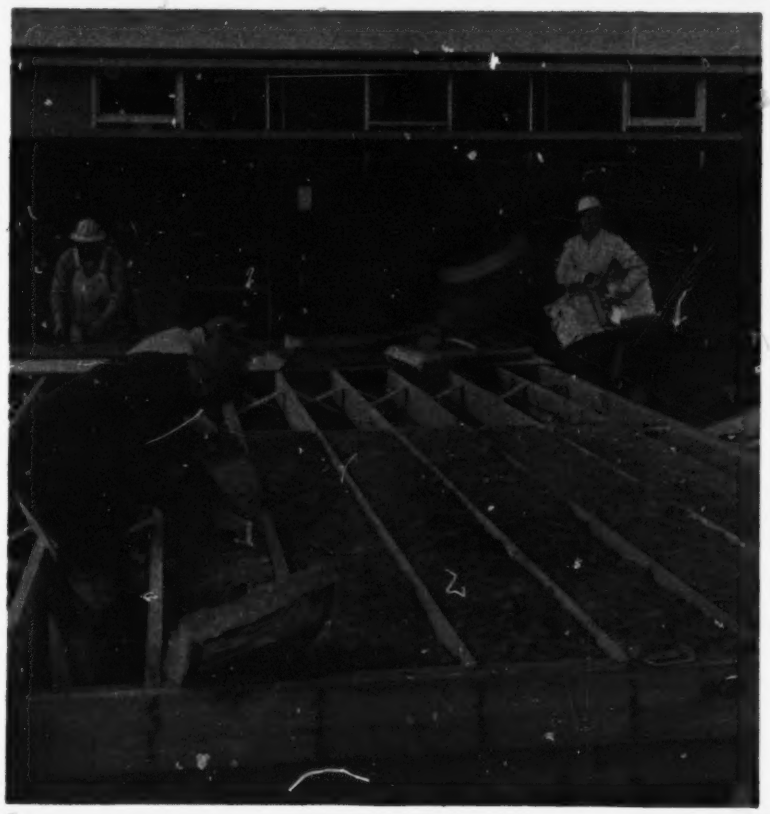
Construction of Unit Number One

1
Simple post and beam footing systems adapt to a variety of building lots—requires no concrete forming and leaves no costly concrete slab behind when the structure is moved.

2
Buildings are fully blanketed with insulation—floors—walls—ceilings—assuring year around comfort and maximum heating economy and reducing distracting exterior noises.

3
Plywood tongue and groove subflooring-underlayment was installed, ready for finish flooring, in just 599 man-minutes. Tongue and groove system requires no blocking at joints.

1



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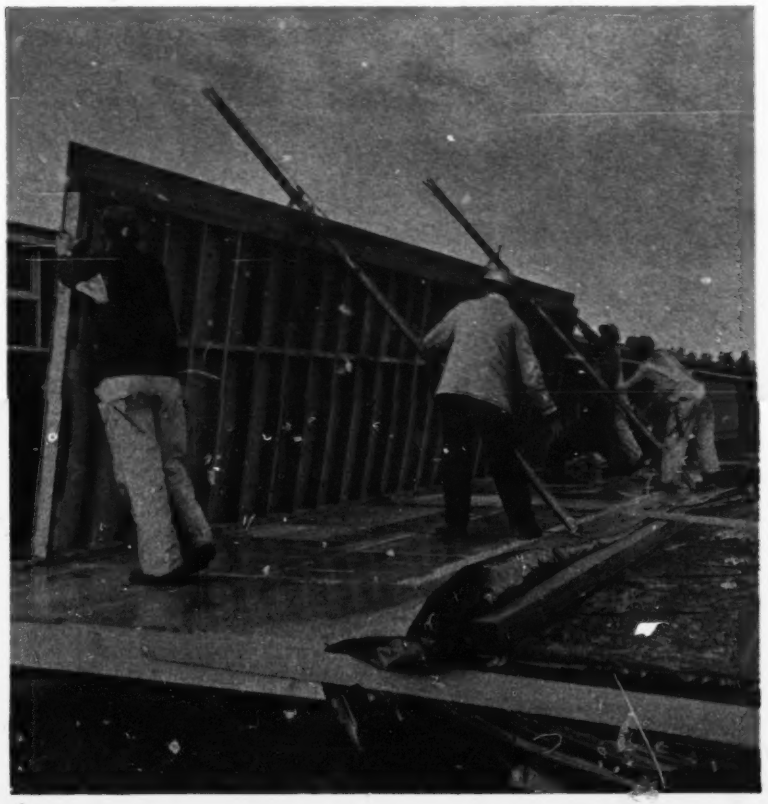
4
Sturd-i-wall (combined wall sheathing and finish siding) was assembled on the floor and tilted into place, a complete wall at a time. Walls were completed in 888 man-minutes.

5
Nailed plywood box beams, an adaptation of the now familiar glued plywood box beam, provide an economical alternative for constructing these light-weight structural members with readily available materials using regular carpenter labor in areas where factory fabricated components are not available.

6
Plywood construction shortcuts such as Sturd-i-wall and plywood box beams helping to reduce on-site labor costs were the important factors in creating this portable structure which cost only $7.50 per square foot.

7
Sheathing roof with plywood and applying built-up roofing consumed only 1,943 man-minutes, demonstrating plywood's ability to get buildings covered and ready for classes quickly.



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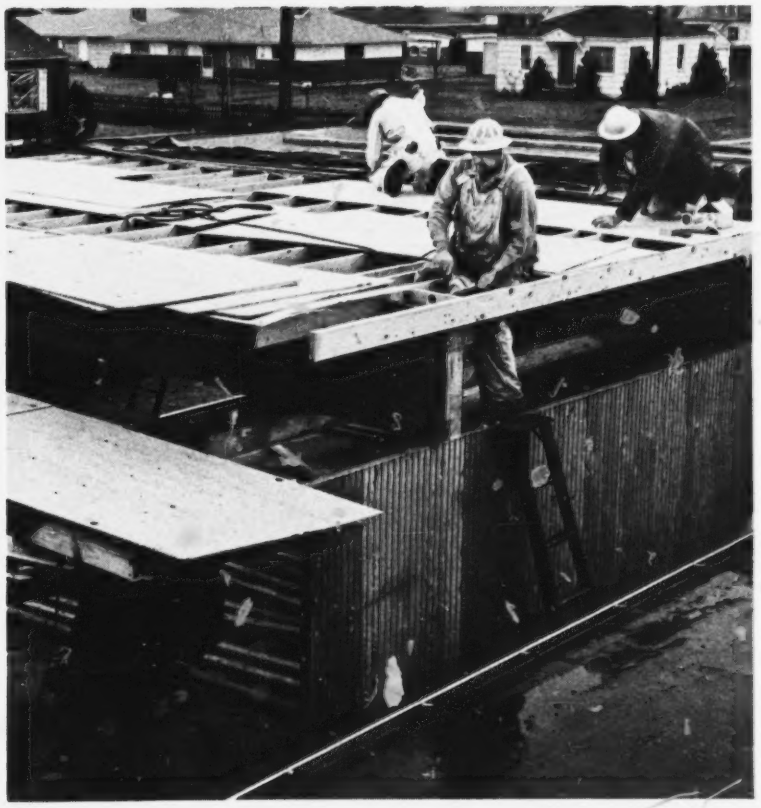

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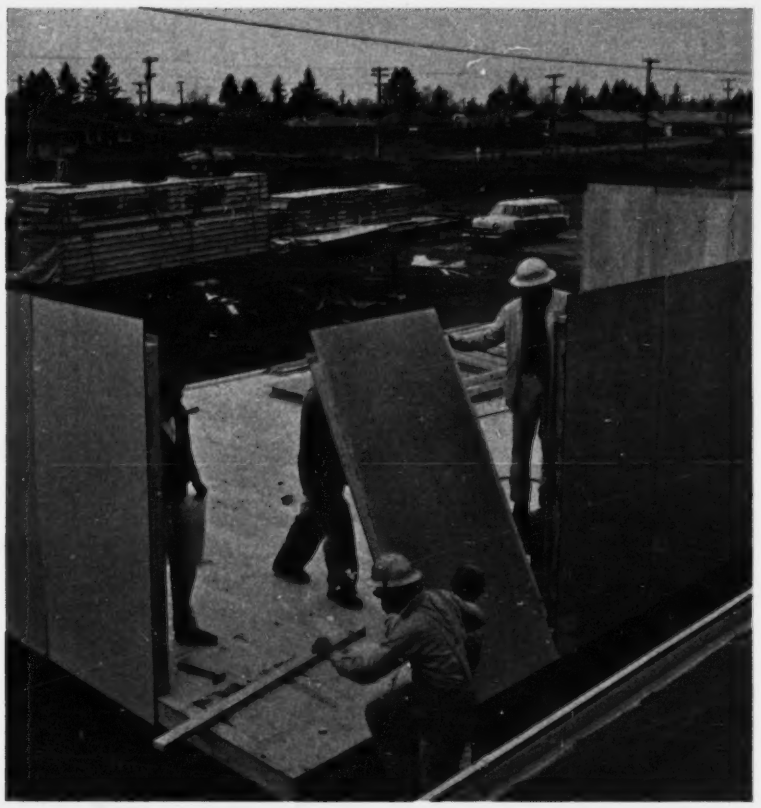

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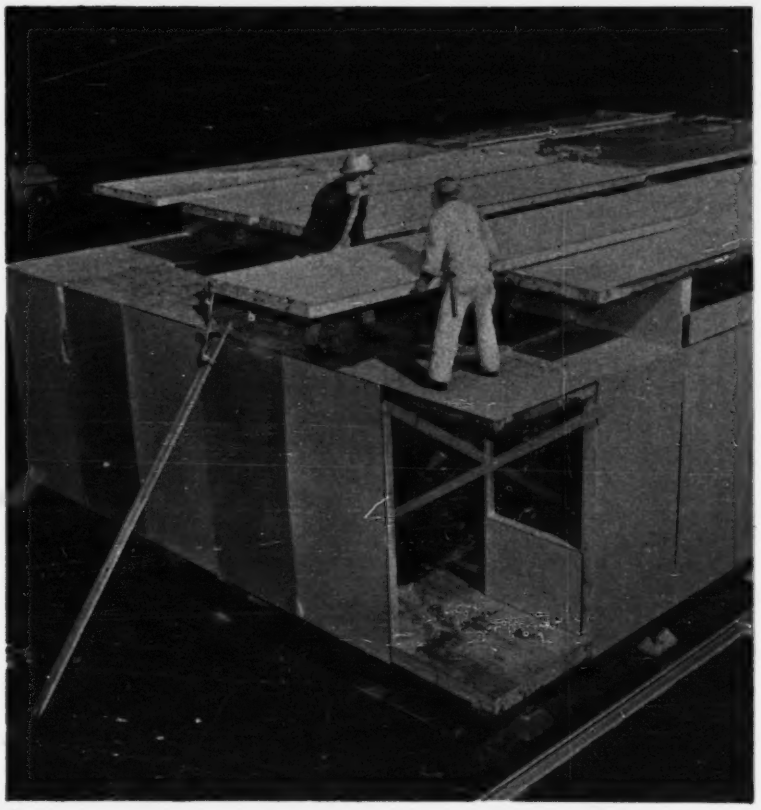


4

Supplementary Classroom Number Two

(Componentized version—entire structure not including footing or floor beams delivered to site in 72 separate components.)

1
Fully insulated, factory built floor panels were lag-bolted directly to floor beams—no joists.

2
Pre-finished Hycon sanspray coated wall panels go into place. End wall panels at left were factory finished with Hypalon, a product of the du Pont Co.

3
Factory finished press glued plywood box beams go into place quickly because of their extremely light weight.

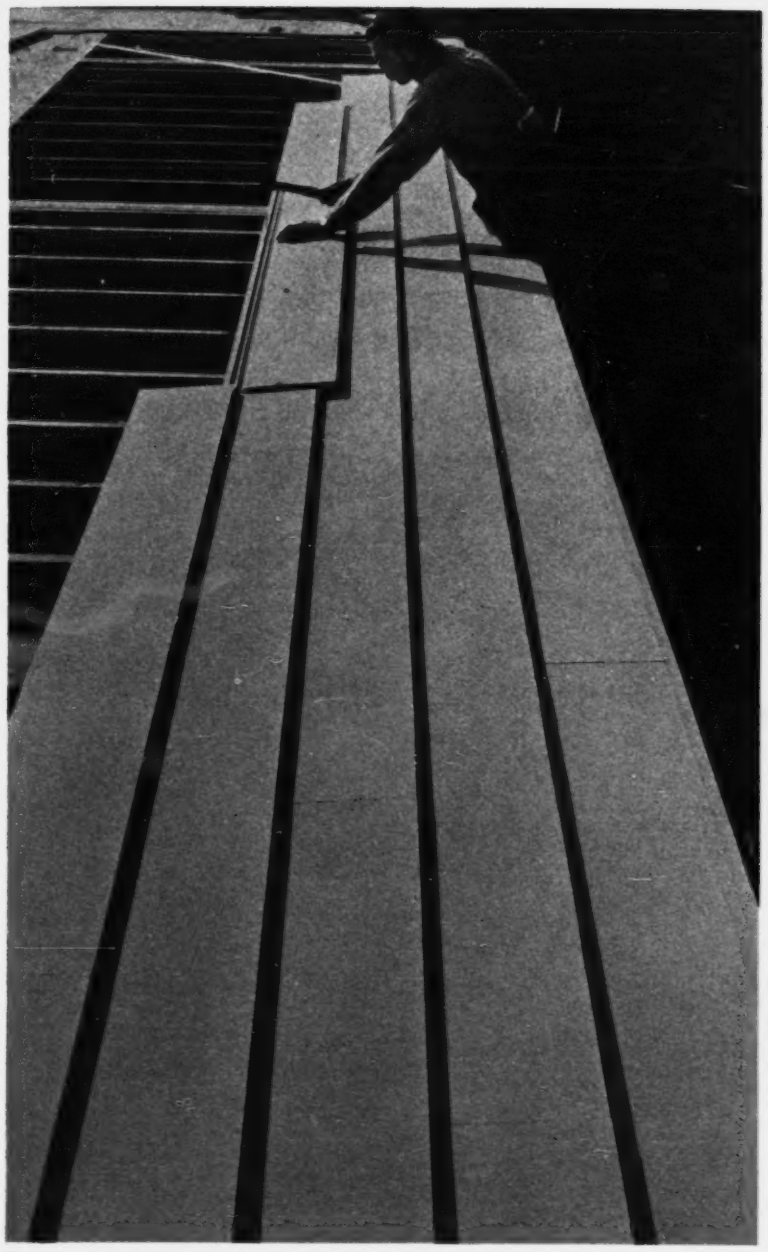
4
Eighteen insulated and acoustically treated roof panels make up entire roof, resting directly on beams. Hypalon was used as roofing and was also factory applied to plywood panels.

5
No costly built-up roofing required here. After roof panels were in place, joints were caulked with a Thiacol compound and sealed with Hypalon. Estimated life of roof is upwards of twenty years.

6
Only finishing required on walls was installation of vertical batts. Batts were sprayed with liquid Hypalon and fastened to wall with double-ended nails.

5

6



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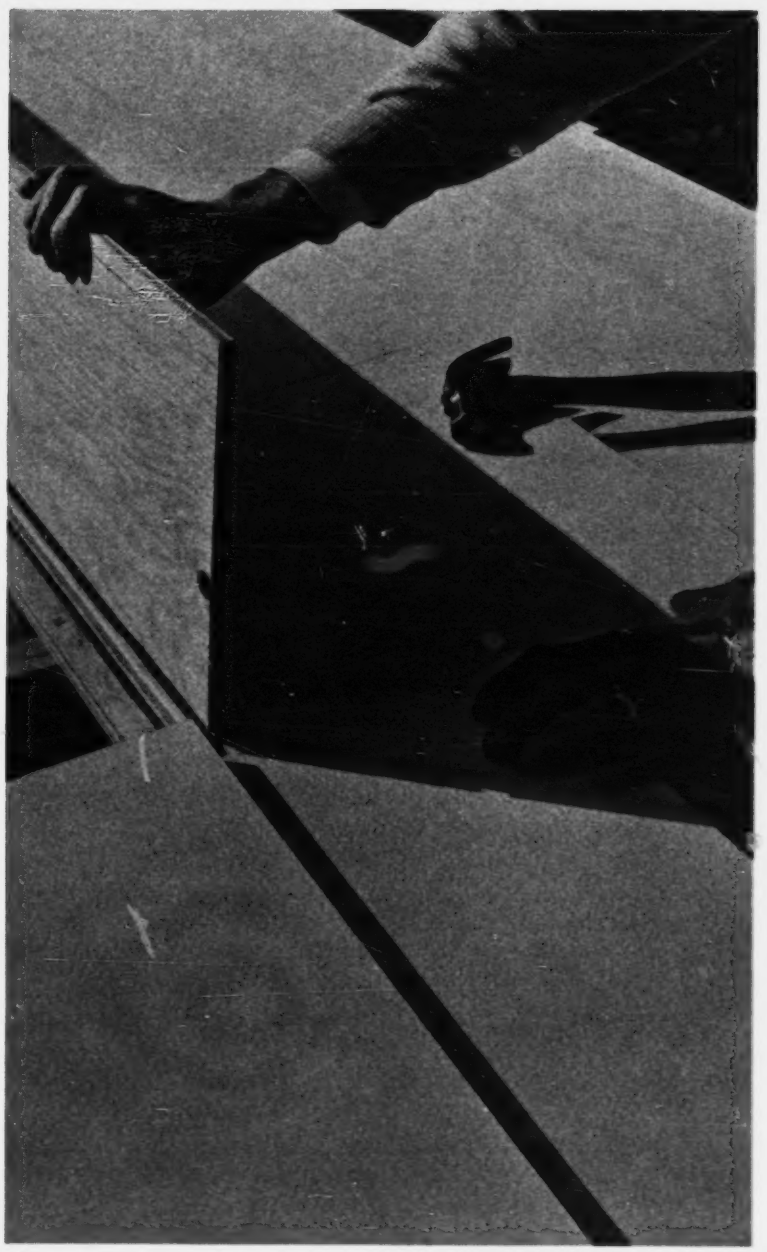


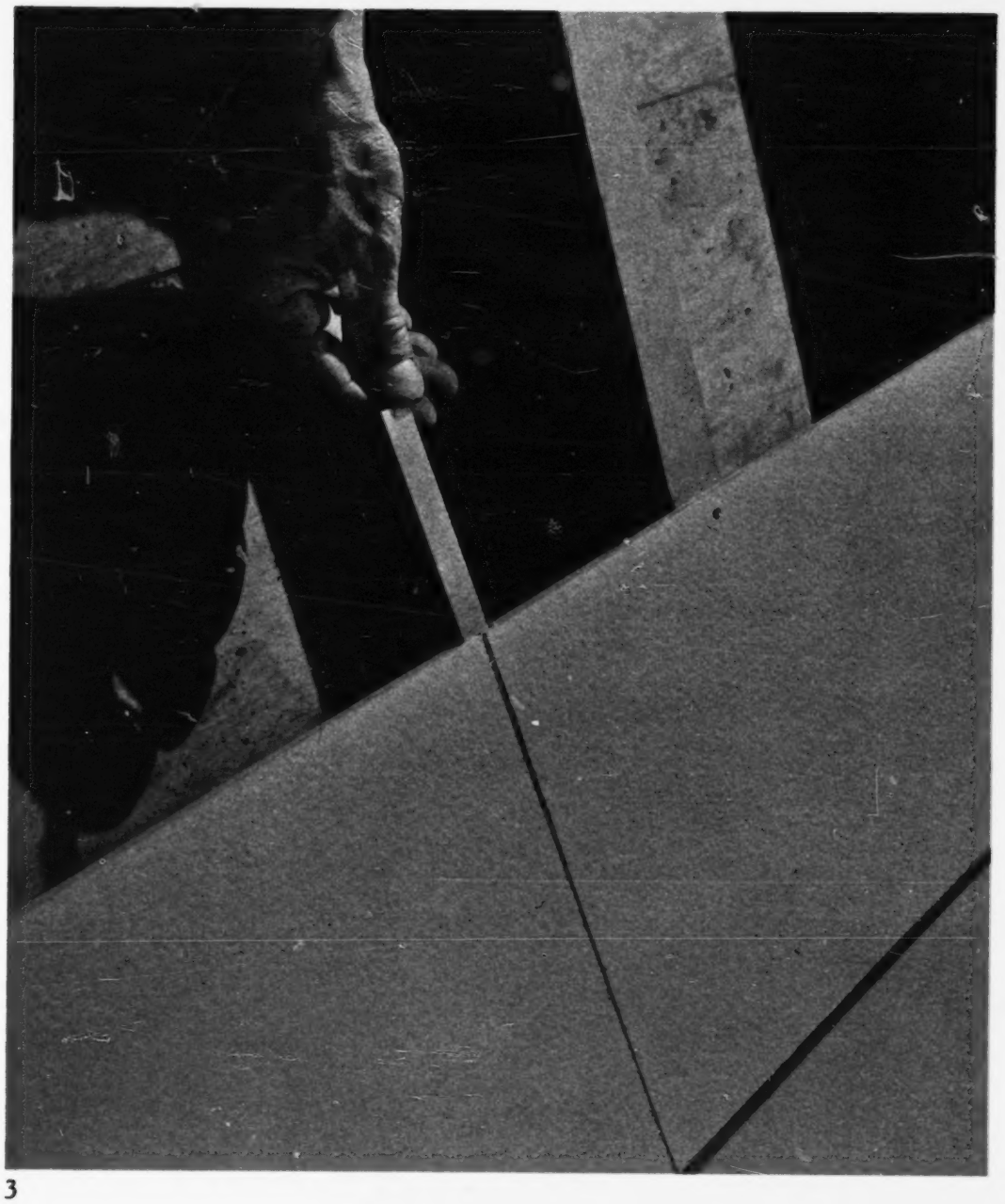
2

Supplementary Classroom Unit Number Three

1
Hypalon coated siding was nailed to framing on floor, then sections were tilted into position. Note that nailing is on back side of panel.

2
When panel is turned up, nails are fully concealed. This close-up view shows detail of grooving on panel back.

3
Staggered vertical joints are secured by metal spline driven into end grooves. This permits butt joints at points not directly over studs.



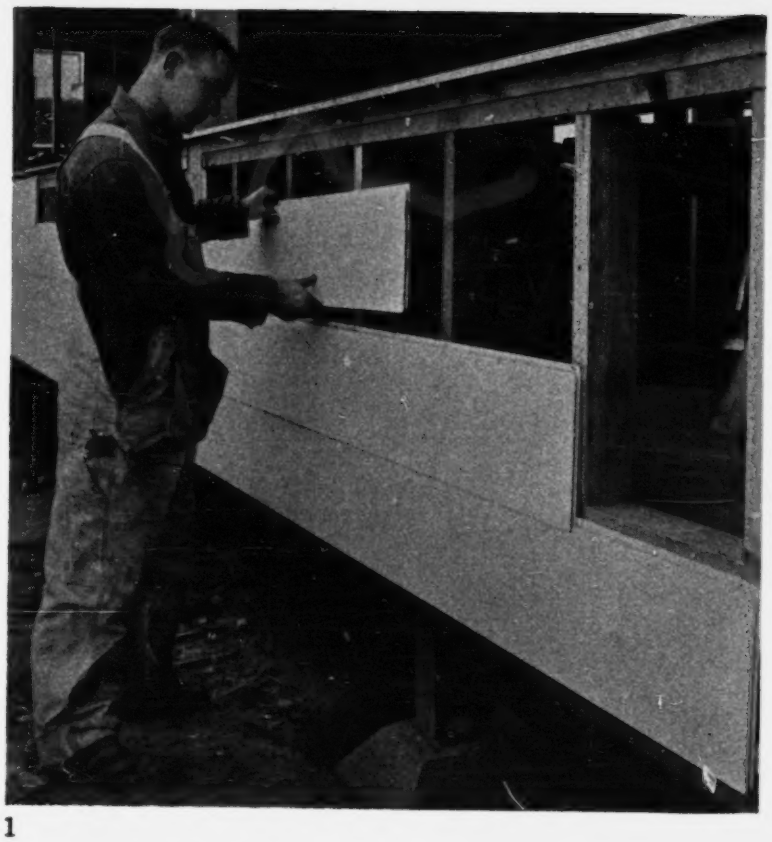
3

In the interest of accelerating development of new and improved construction techniques, DFPA, working with the same basic design used in supplementary units one and two, built a third unit as an addition to the Franklin Pierce High School near Tacoma. This unit is being utilized as student lounge and bookstore.
Purely an experimental building, it utilized radically new siding materials and techniques not yet available commercially. Basic construction was conventional with standard floor and roof joists sheathed with plywood, and Sturd-i-wall siding.

DU PONT HYPALON PLYWOOD LAP SIDING

One wall utilized a revolutionary new experimental lap siding developed by E. I. du Pont de Nemours & Company. Du Pont Hypalon is factory applied to plywood panels. The reverse side of the finished panel is then V-grooved along its length through to plywood veneer adjacent to the Hypalon finish. The resultant panel can be then folded to form a lap siding with all nails concealed under the laps as illustrated in the adjacent photos.

Unit Number Three (CONTINUED)



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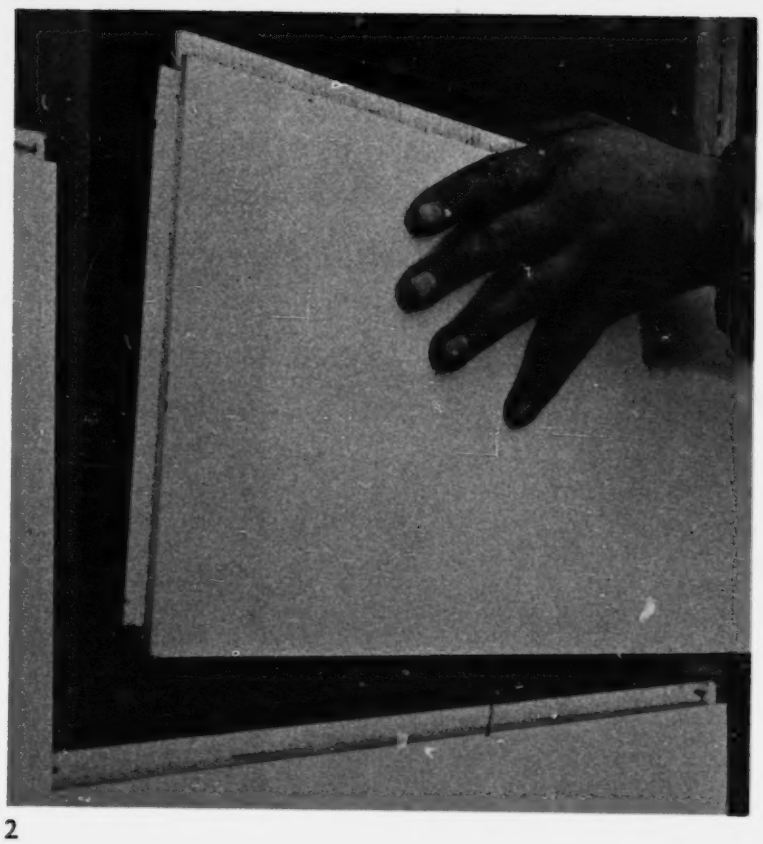


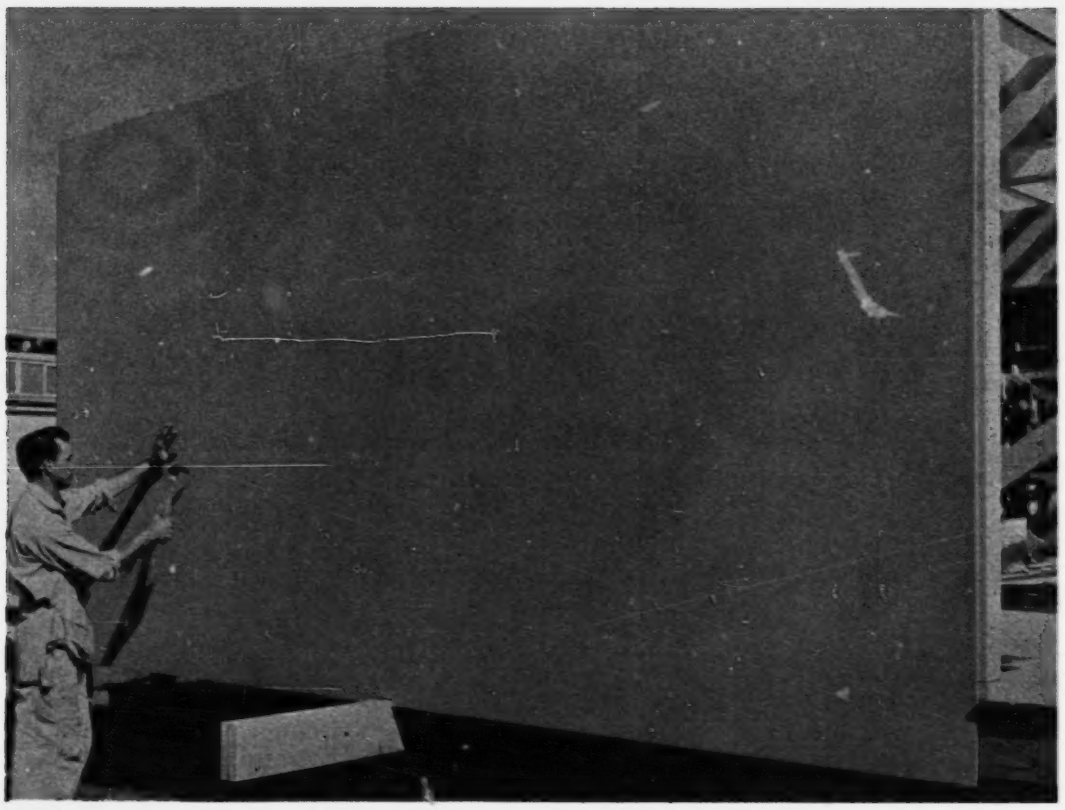
2

DFPA TONGUE AND GROOVE LAP SIDING

An experimental tongue and groove plywood lap siding developed through DFPA research is also featured in this unit. This also utilizes a long lasting factory applied Hypalon finish.

1
Bottom course is nailed into place, and succeeding course conceals nailing of the first.

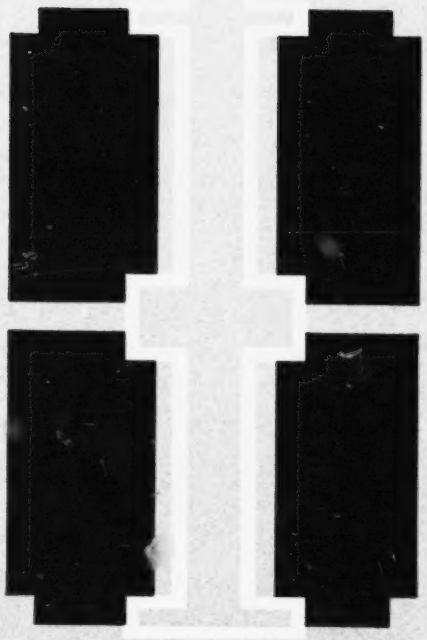
2
Tongue and groove panel ends solve problem of vertical joint treatment.



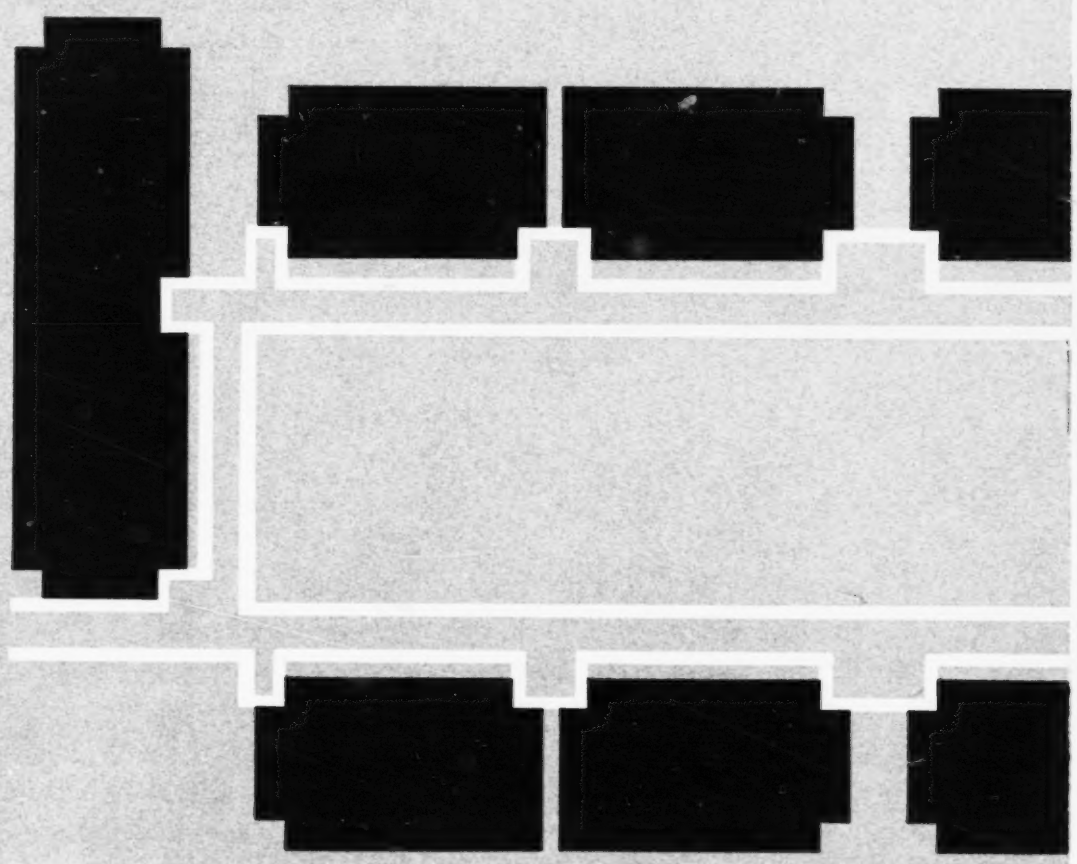
FACTORY FINISHED TEDLAR PANELS

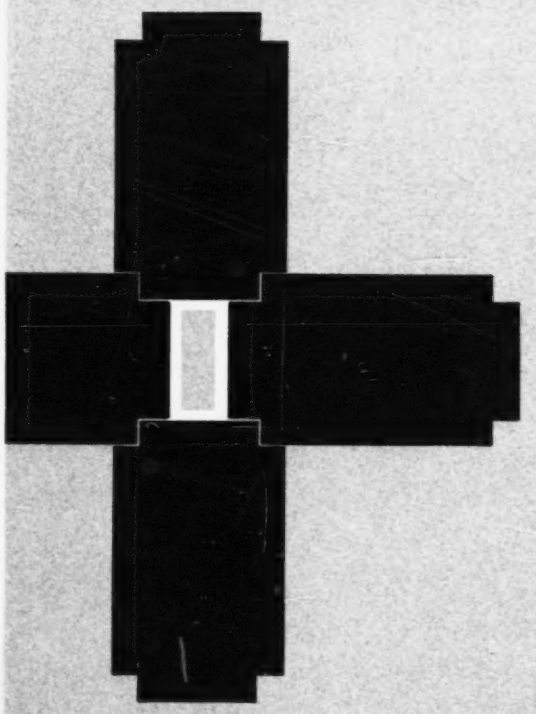
Another experimental factory-applied du Pont finish was used on the flat wall panels at the ends of unit number three. Tedlar, a fluoridated vinyl coating, shows great promise as an exterior finish in respect to weathering and wear resistance. Although not yet available commercially, it will, when marketed, be offered in a variety of colors. This finish is in the final stages of the exhaustive DFPA coatings test program.

TYPICAL PLOT PLAN



ALTERNATE PLAN—COMPLETE TEMPORARY FACILITIES





ALTERNATE CLUSTER PLAN

Classroom Clusters

DFPA's supplementary classroom design adapts easily to "cluster" groupings in units of two, four or even entire schools of a dozen or more portable structures.

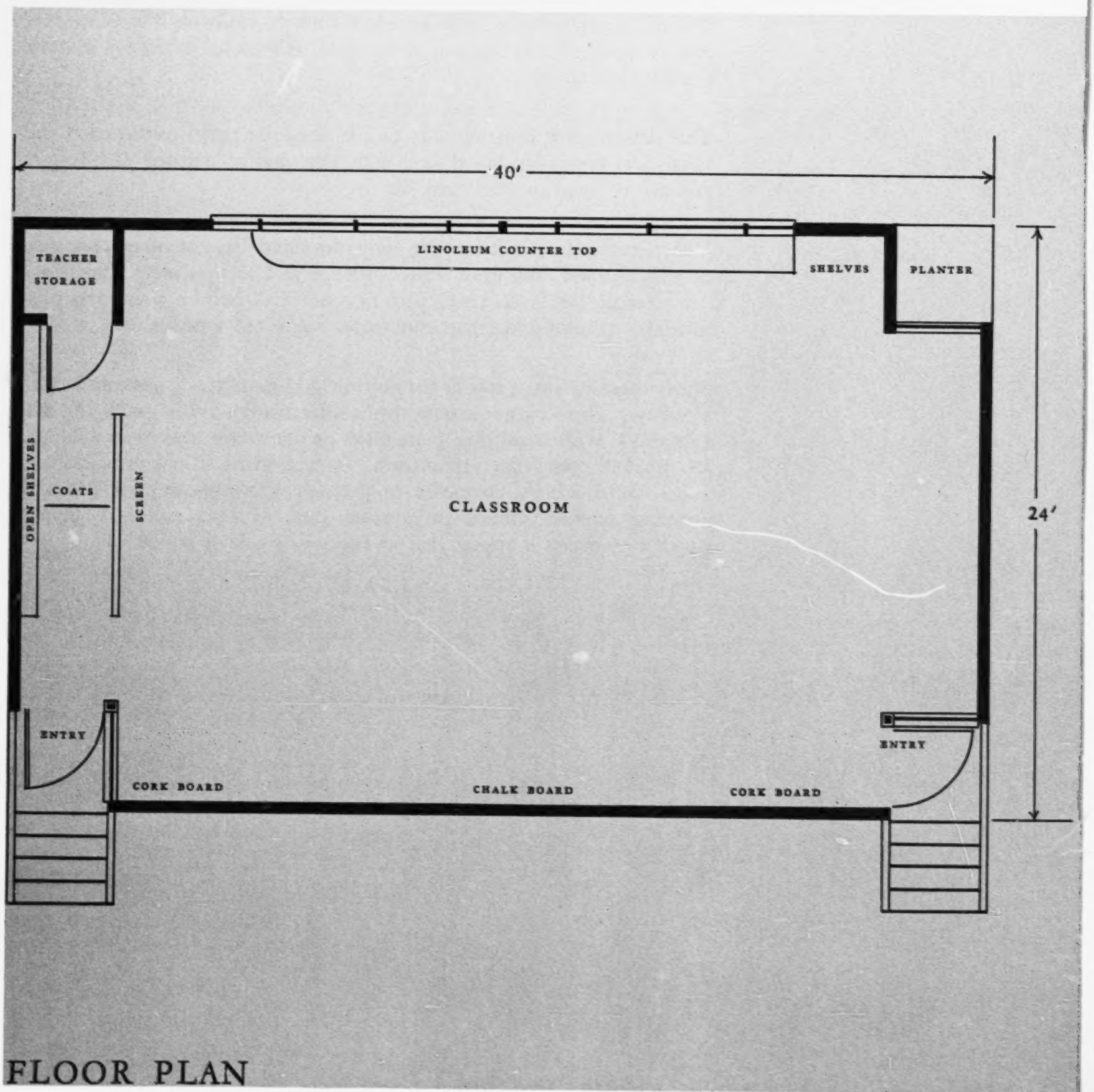
This design's low contemporary profile, modular panel construction and near ideal floor plan blend well with any type of existing architecture and can be fitted to nearly any site.

The partition-free interior also provides flexibility for other uses such as administration offices or student lounge and activity areas. Provisions can be made for covered walkways to connect all buildings and plans for integral or centralized separate restroom facilities are available.

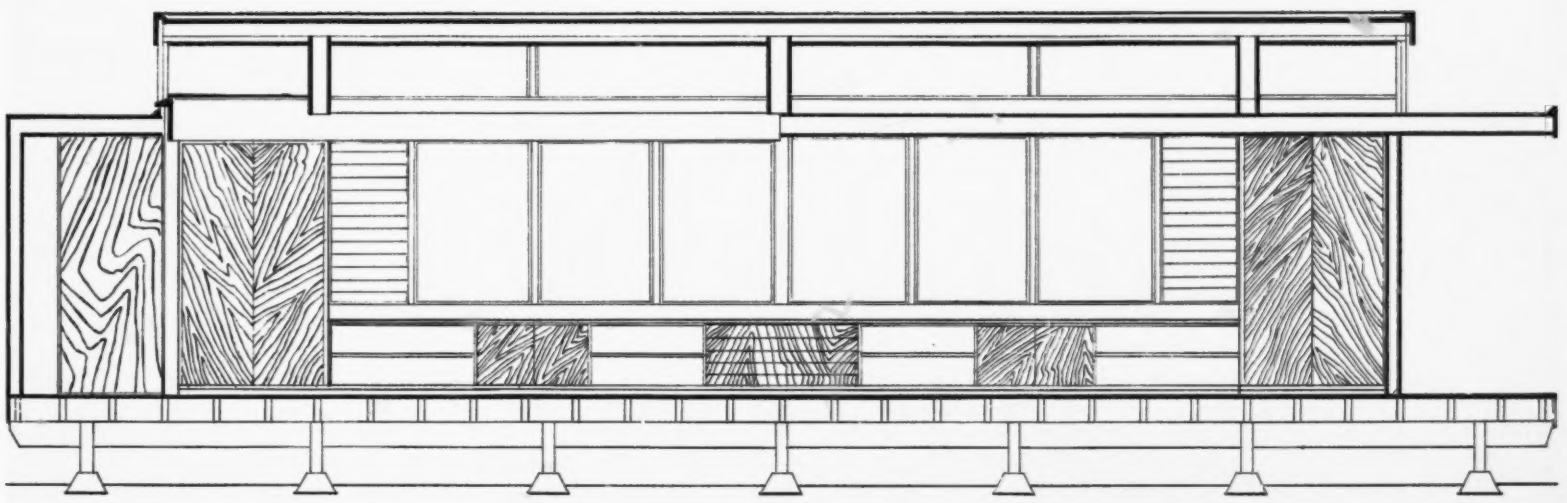
Shown here are just a few of the possible groupings made possible by this structure. These cluster arrangements offer many advantages to the district faced with a shifting population or one whose classroom shortage has reached emergency proportions. In fact, many school districts have found entire schools composed of portable structures to be a safe and adequate interim solution in problem areas where a rapidly changing population makes it appear that an entire new school is needed.

Study Plans

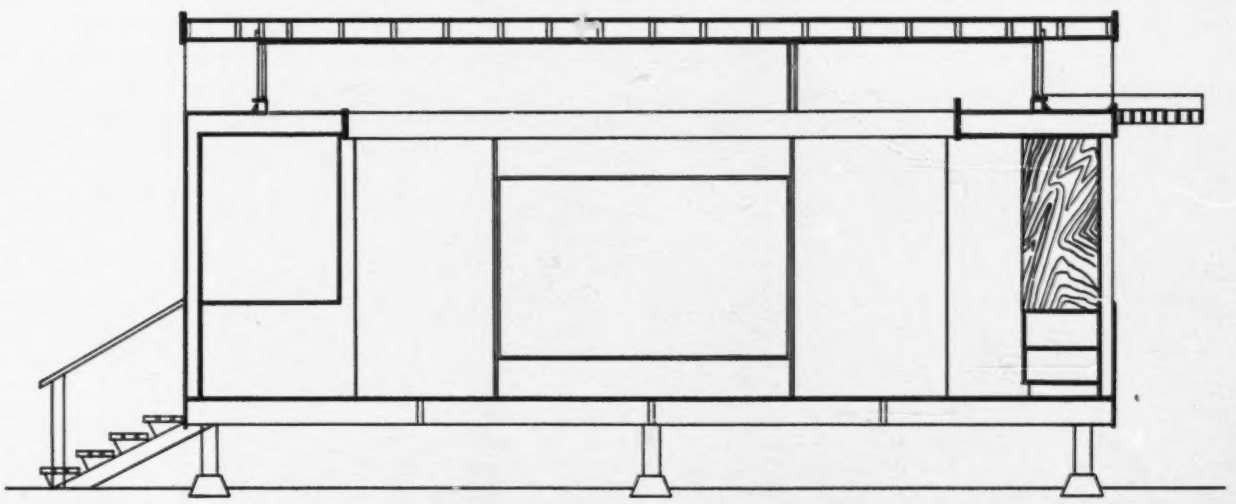
These are included only to indicate typical elevations and plan views. For complete working drawings on either the conventional or panelized version of the DFPA supplemental classroom, write the Douglas Fir Plywood Association, Tacoma 2, Washington.



FLOOR PLAN



FRONT ELEVATION/CROSS SECTION



SIDE ELEVATION/CROSS SECTION

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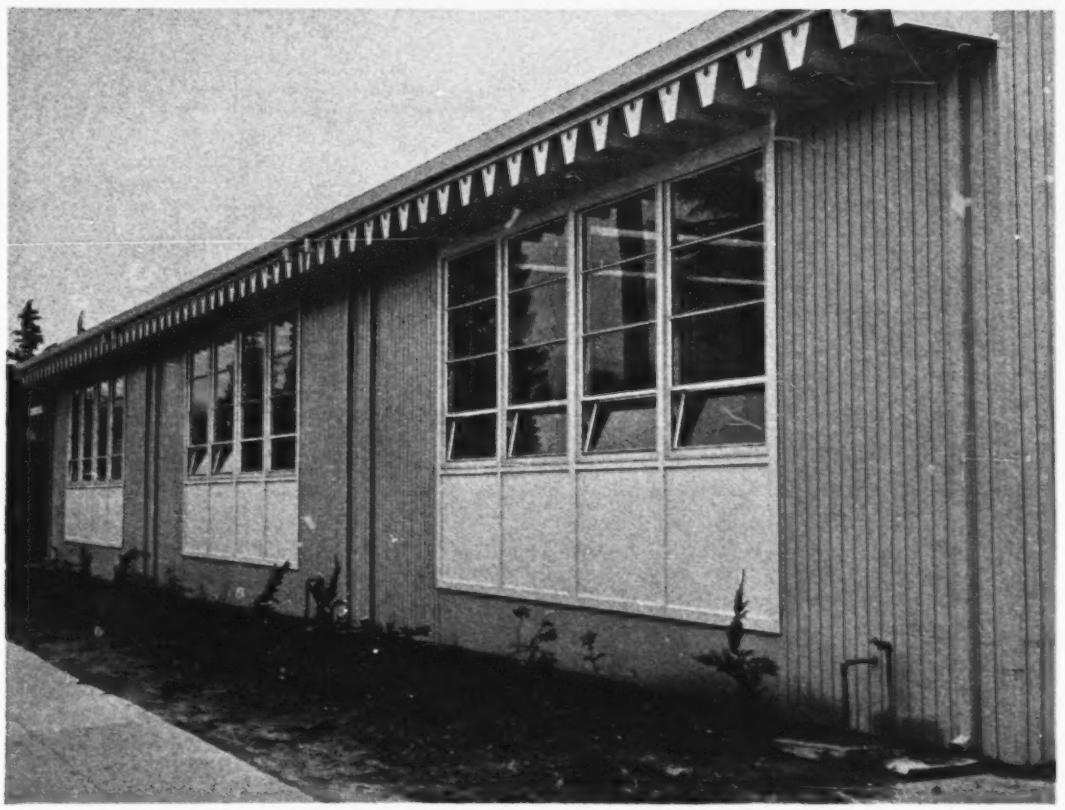

3

Other Plywood Portables around the Nation

1
Typical of many of the well-designed transportable plywood classrooms in use elsewhere throughout the country are these designed by Wallace Holm and Associates, Monterey, California for the Monterey School District at the Del Rey Oaks School. They feature stressed skin plywood roof panels, 5/8" plywood sub floors and Texture One-Eleven siding. The cost of the six units, including a long electrical service, walkways, etc., was about $82,000. Or, about $13,000 each of which approximately $1,000 was for the extras mentioned above. These units rest on steel and wood sleepers and are readily movable. Note the shuttered windows for complete light control.

2
Monostructures, Inc., Sarasota, Florida developed this componentized plywood portable. It features lightweight, but tremendously strong honeycomb core plywood sandwich panel construction. The standard building measures 24′ x 32′. Siding is exterior Texture One-Eleven plywood. The building can be varied for one or two doors and either louvered or jalousie-type windows.
The whole structure centers on the one 5-inch x 24-inch x 32-inch foot roof beam running full length of the building. This beam supports 16 feet of roof on either side, 12 feet of ceiling and 4 feet of overhang outside the walls.
Running the length of the building and supporting the entire unit are four 4-inch x 1-foot x 32-foot Monostructure floor beams. Each of these box beams rests on concrete pilasters. Panels are four inches thick with 1/4" fir plywood skins. Spans are 8 feet.

3
Here is a temporary classroom design developed for the *Santa Clara, California, Elementary School District* by Architect L. F. Richards, Santa Clara, California which is designed to be cut in two for moving. According to Richards, "Previous portables which we designed were limited to 26′ in width because of local highway requirements, so our divided building made possible easier movement and its shape met the California School Planning Department requirements. We felt that the use of Texture 1-11 as an exterior finish and the "Trof-dek" (a plywood roof component) gave us a stiff building which would not lose its shape when moved."
Dimensions of this building are 30 x 28 with a fabricated Trof-dek roof covered with 3/8" plywood sheathing. In addition to the Texture One-Eleven walls, floors were of 1 1/8" 2-4-1 plywood.
Complete costs for each unit including all materials, labor, inter-com, phone and plumbing was around $10,800.

20

DFPA Program of Quality Control

The Douglas Fir Plywood Association's applied and product research programs through the years have given birth to many of the construction developments utilized in the Supplementary Classroom such as: Sturd-i-wall, T&G subfloor-underlayment; plywood structural components such as box beams and stressed skin panels; overlaid plywoods and Texture One-Eleven; as well as the rigorous testing program which established standards for the long-lasting finishes used in both classrooms.

Important as these developments are however, they are overshadowed by the steady day-to-day job DFPA performs in maintaining the quality of the plywood which makes these more dramatic developments possible. Just as a sound education program is necessary to develop scholarship, a sound quality control program is vital to the plywood industry in order for it to make the most of its products.

New building systems and finishes all make greater demands on materials and dependability of performance is absolutely essential.

That's why it's more important than ever before to specify and buy only DFPA grade-trademarked plywood. It's the only plywood backed by an industry-wide quality control program, and a quarter century of experience in plywood testing and inspection. This program is supported by the overwhelming majority of fir and western softwood plywood manufacturers, accounting for 85 percent of industry production.

You can depend on plywood with the DFPA grade-trademark because the DFPA quality control program checks every critical step in plywood manufacture. It includes factory inspection by trained quality supervisors—rigorous laboratory testing of production samples, and exposure to actual weather conditions—and in-use testing of new products and finishes. Quality control is backed by DFPA research into new structural systems and information to help you to build better schools with plywood for less money.

It pays to specify only DFPA grade-trademarked plywood for all types of school construction!

PUBLISHED BY

THE DOUGLAS FIR PLYWOOD ASSOCIATION, TACOMA 2, WASHINGTON

FORM NO. 62-310